

# 10 Solid reasons why Compact Disc will be the new world standard for Digital Audio discs

## Better Sound Reproduction

The CD digital audio system, with its 16-bit word configuration, can translate sound information far more accurately, and over a wider range, than any existing disc reproduction system. With digital recordings, made expressly for CD, the system exhibits its total superiority. But any existing analogue recording can be converted to CD digital format, with considerably improved reproduction quality.

## 60-Minutes UNINTERRUPTED Stereo Playing Time

A 120 mm diameter disc will give up to 60 minutes of stereo playing time without interruption (equal to an LP).

## Two-way Protection Against the Effects of Scratches and Dirt

With CD, the recorded information does not lie naked and exposed on the surface of the disc. It is encapsulated in a transparent protective coating, but still fully accessible to the laser beam which is focussed upon it. Dirt, dust and scratches can only appear on the surface, where they are out of focal range, and have no influence on sound quality. In addition, the digital reproduction circuitry has its own built-in error detection and correction system to take out dropouts or bursts if they should appear. This means that no particular care is needed in Compact Disc handling or storage. It is not even necessary to keep the discs in sleeves, and they can be cleaned by simply wiping with a damp cloth!

## No Wear on Disc or Pick-up

With a laser beam 'stylus', there is no mechanical contact between pick-up and disc. The ultra-sharp beam can never be blunted, and it causes no more wear on the disc than you are causing by reading this sheet of paper. Even continuous use produces no deterioration in performance.

## Mini-sized Player, Pocket-sized Disc

The small dimensions of the CD player (the chassis is much the same size as a compact cassette mechanism) make it fully compatible with mini HiFi and car audio components, as well as the highest specification rack systems. It can also be integrated into combination equipment, pointing towards the mini HiFi music centre. The discs themselves slip conveniently into pocket or handbag, and a complete library occupies only one-sixth of the space required for the equivalent number of LPs. Durability and compactness make Compact Discs easy to send by post – a big stimulus to mail order and gift business. For the trade, there will be new opportunities in packaging and display (with reductions in cost). Self-service units can offer very wide choice in a small space, yet still with completely adequate safeguards against shoplifting.

## Compact Discs at LP Prices

With sales of sufficient volume, Compact Discs will be directly comparable in price with existing LPs. Compact Discs can contain a lot more recorded information, but they are much smaller and more robust, bringing substantial cost savings in raw materials, packaging, storage and transport.

## The CD Player – Far Higher Performance, No Higher Price

A CD player will cost much the same as a high quality LP record player. But with its spectacular sound quality and unique features, the CD player is going to be fiercely competitive against even the very finest existing HiFi record players.

## Superb Quadraphony

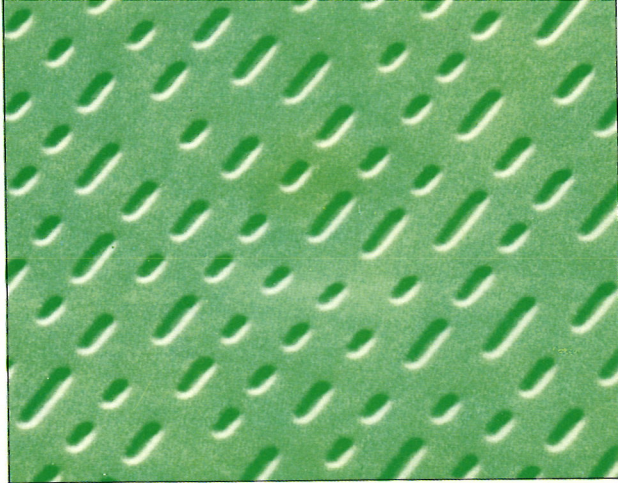
The CD system is designed to accommodate 4-channel recordings, with unprecedented realism because of the high-quality reproduction and virtually total channel separation. Playing time is reduced, but the sound quality may well be just the stimulus needed to awaken a big new interest in quadraphony.

## Simple To Use – Yet So Versatile

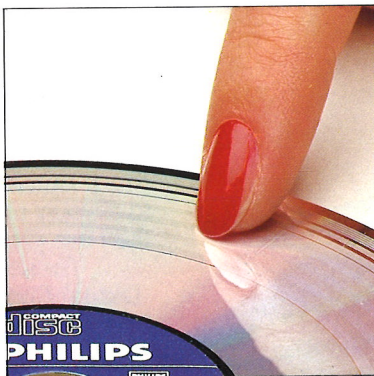
Basically, a CD player is even easier to use than a cassette player – just pop in the disc, close the lid – and the music starts. But it is easy to include programming information in the digitally recorded discs – so that the player can select tracks, play them in any desired sequence, and even show titles and supporting information on an integral visual display unit.

## Compatible with Existing HiFi Equipment

Although CD is a digital audio system, it has an analogue output interface, so that it will connect directly to any normal HiFi installation.



CD visual display unit.



Mirror-bright Compact Disc – impervious to scratches...



... and fingermarks (pocket-sized, too)



# The benefits of Compact Disc



# 10 Sound reasons why Compact Disc Digital Audio achieves far superior sound reproduction

## **No Rumble**

## **No Wow and Flutter**

The laser pick-up scans the digital track at a constant linear velocity, tightly synchronised with information encoded in the track itself. As a result, the disc rotation speed varies inversely with the scanning radius, from 500 rpm at the inside (start) to 200 rpm at the outside (end) of the track. At these high and accurately maintained speeds, there is no sign of rumble or wow and flutter.

## **True Frequency Range**

## **True Dynamic Range**

With optical scanning of digitally-encoded sound signals, there are absolutely no mechanical or electromagnetic limitations on either frequency response or dynamic range, and exceptionally high specification figures are obtained.

## **Negligible Noise**

## **Negligible Distortion**

In digital audio, signal-to-noise ratio depends on the number of bits in a word, i.e. the accuracy with which the audio signal is expressed. In the CD system, each bit contributes approximately 6 dB to a remarkable signal-to-noise ratio of over 90 dB. Compare that with 50 - 60 dB for an LP (and 30 dB for an old 78).

Harmonic and intermodulation distortion are fixed by the relation between the highest audio frequency and the sampling rate. The CD parameters ensure extremely low distortion figures.

## **Complete Channel Separation**

## **No Sound Coloration**

In a CD digital recording, left and right channel sound signals appear alternately, in completely separate words. Since they cannot mix in the player, channel separation is over 90 dB (as against 30 dB for a good record player).

The laser beam always reads the track exactly, and the digital circuitry of the player continuously checks that the reading is correct. So the CD system neither leaves out any sound information, nor adds any of its own.

## **No Groove-sticking or Jumping**

## **No Mechanically-induced Noises**

Tracking error is eliminated because scanning is controlled by information in the track itself. The laser beam cannot skate, it offers no microphony link and is completely uninfluenced by static electricity.

Dust, dirt and scratches are sealed out of the digital track (and the focal range of the laser beam). Clicks, crackles and hisses are completely eliminated.



Prototype CD Player



Laser-beam stylus

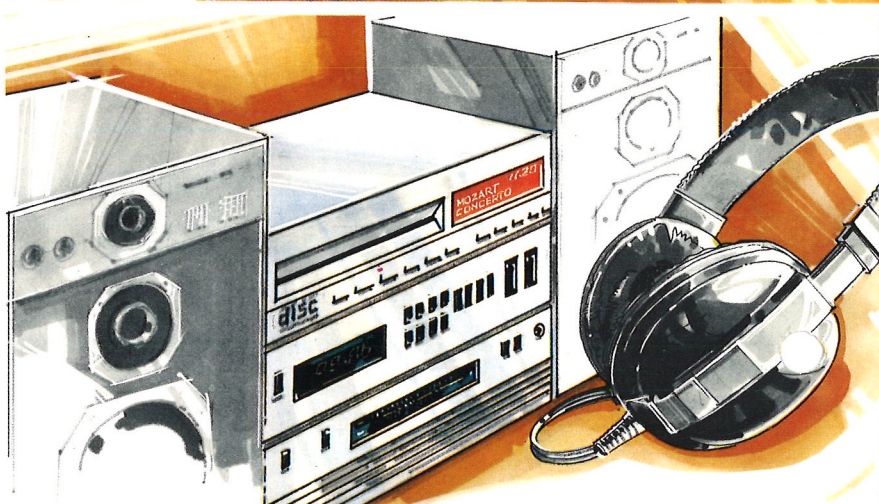
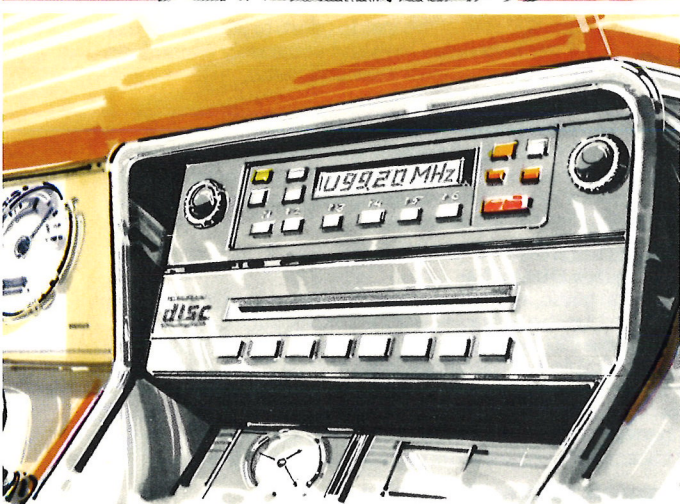
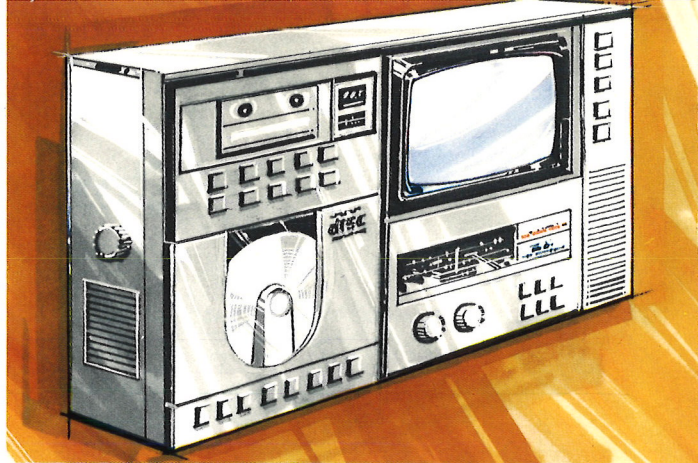
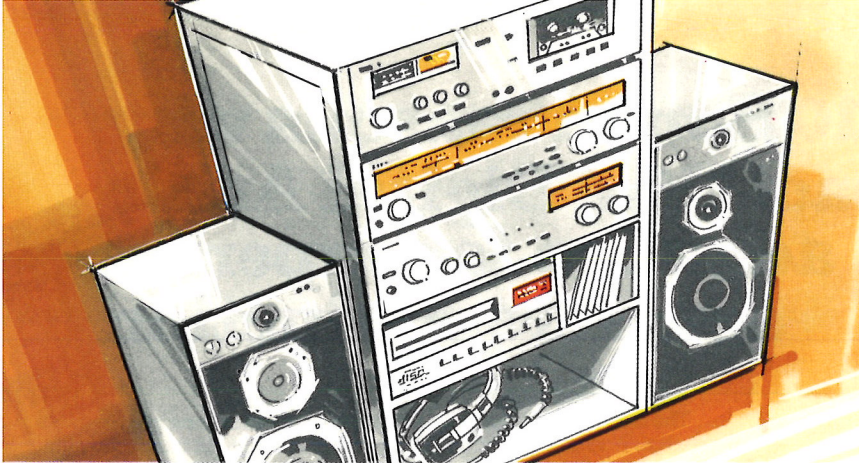


Solid-state laser



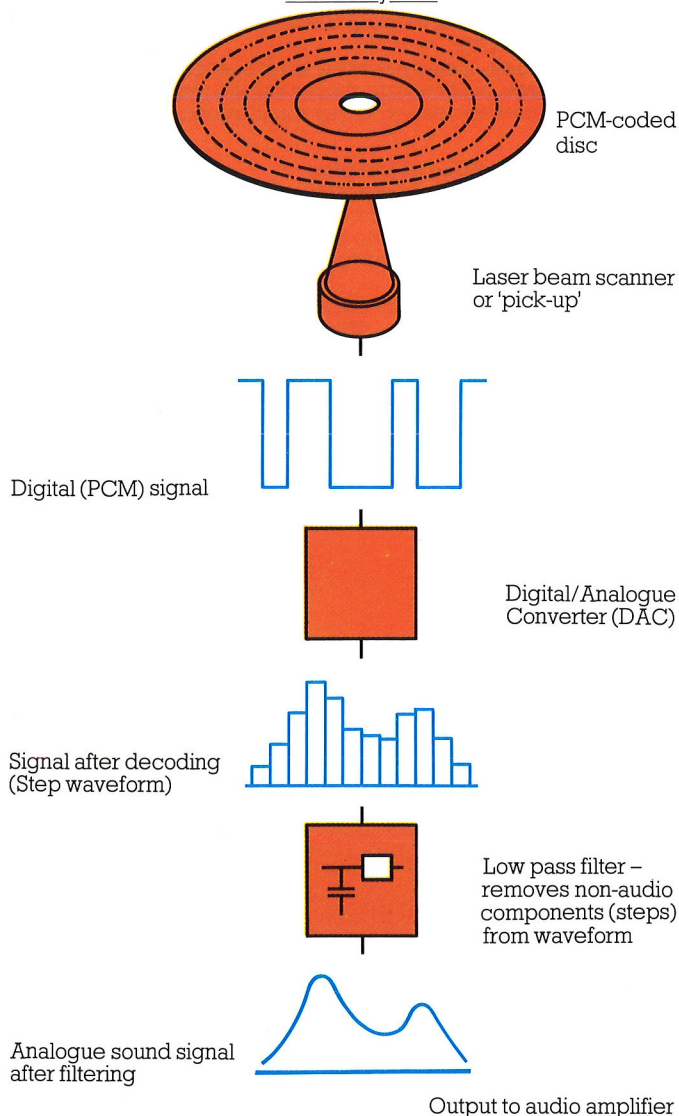
# Compact Disc Digital Audio





The shape of Sound to Come: Compact Disc Digital Audio in four typical applications.

The CD System



## CD - Digital sound reproduction with laser beam scanning

A 120 mm diameter disc that plays for an hour without turning over clearly contains ultra-concentrated sound information. In fact, a Compact Disc contains over 5 billion digital sound signal bits. And that does not include all the extra bits (used for such tasks as speed control, error correction and visual display) which contribute so much to CD's unique audio performance.

Each bit is either a flat surface, representing 1, or a microscopic pit, representing 0. They are laid out in a helical track, and one unit of sound information consists of 16 bits. This is known technically as a word, but it has no connection with the spoken word. It is a word in a special code known as PCM - Pulse Code Modulation.

As the disc rotates, it is scanned (from behind, and from the centre outwards) by a concentrated light-spot several times thinner than a human hair. This beam detects the sequence of pits and flats at a rate of approximately 4.3 million bits per second. Response is at the speed of light - immeasurably faster than the conventional stylus in the groove. Each PCM word is read in under 10 microseconds at a constant rate. The speed of the disc is controlled by coded information on the disc itself.